DOCUMENT RESUME

ED 170 154 SE 027 632

TITLE	Black Contributors to Science and Energy Technology.
INSTITUTION	Department of Energy, Washington, D.C. Office of Public Affairs.
REPORT NO	DOE-OPA-0035(79)
PUB DATE	79
NOTE	28p.
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Biographical Inventories; Black Achievement; *Black Leadership; Black Role; *Energy; Minority Groups; Models; Motivation; Science Education; Sciences; *Scientists; Technology

ABSTRACT

Presents biographical and pictorial information about 12 black scientists and inventors who were selected to serve as models for children who have little opportunity to learn of black contributions to science and technology, and as motivation for students who are uncertain about continuing their studies or about selecting professions. Much of their work has been in the use of energy, as in space technology, transportation, construction and many other military and industrial applications. (HM)

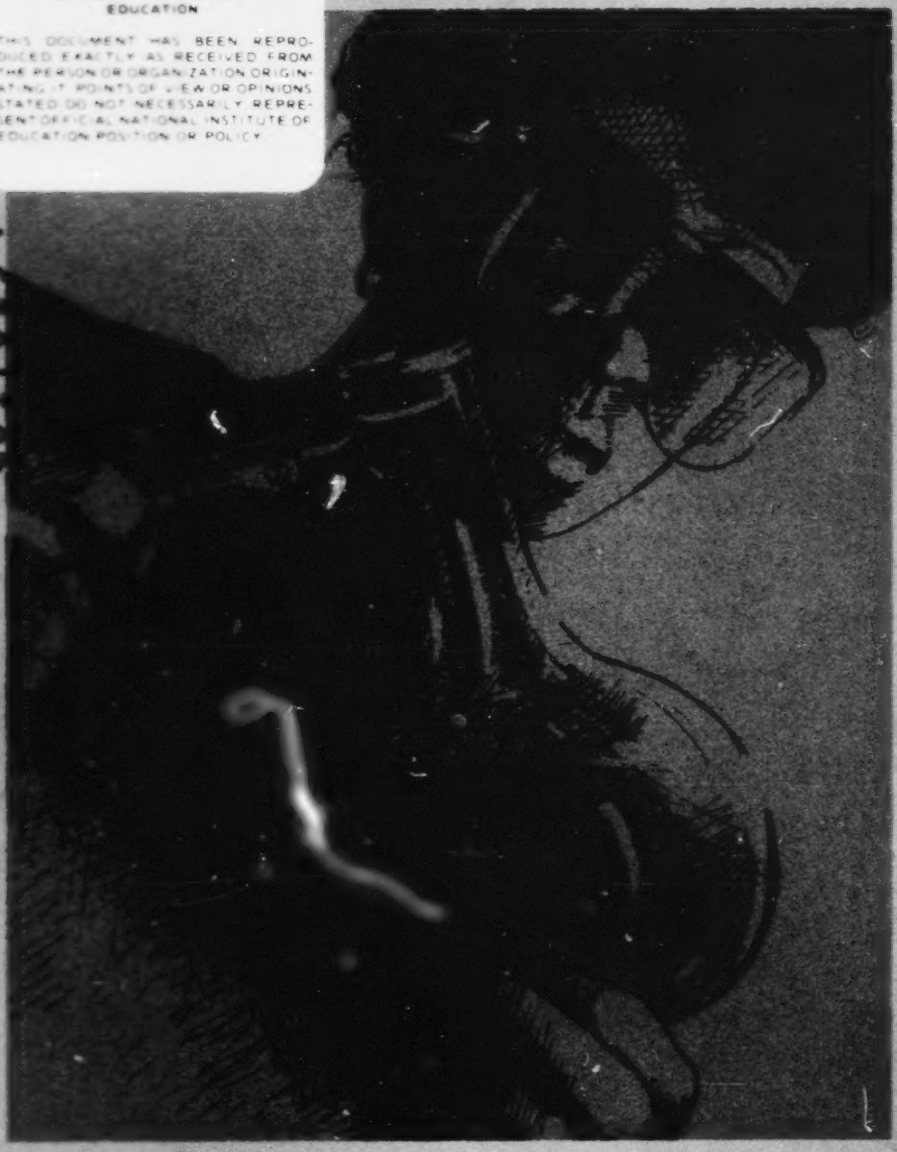
****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Black Contributors

To Science and Energy Technology

U.S. DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

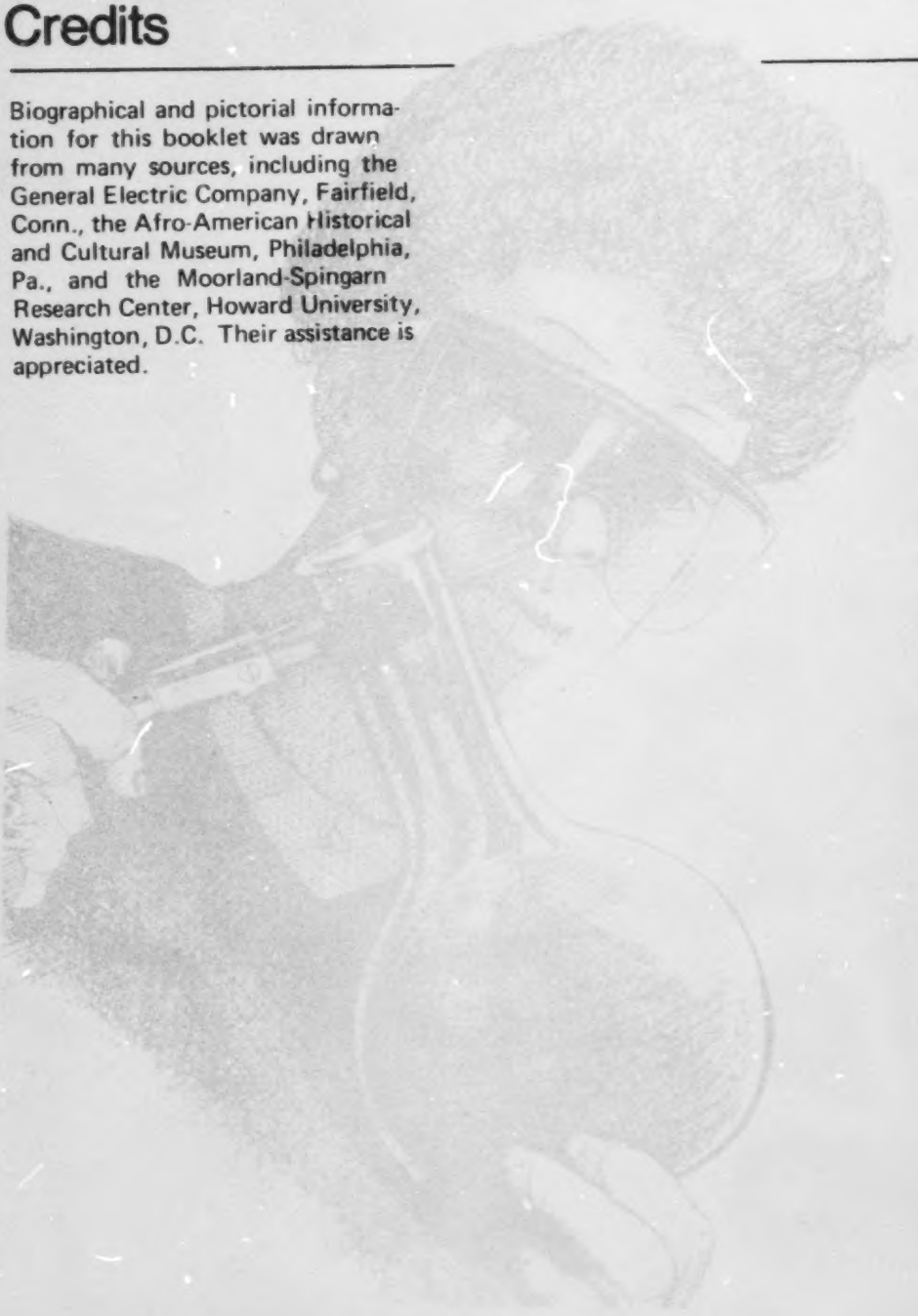


ED170154

SE 027 632

Credits

Biographical and pictorial information for this booklet was drawn from many sources, including the General Electric Company, Fairfield, Conn., the Afro-American Historical and Cultural Museum, Philadelphia, Pa., and the Moorland-Spingarn Research Center, Howard University, Washington, D.C. Their assistance is appreciated.



Introduction

The scientists and inventors profiled in this booklet are only a few of the Black contributors to American science and technology. Much of their work has been energy related—if not in the development of energy resources or processes, then in the more efficient or productive use of energy, as in space technology, transportation, construction, and many other military and industrial applications.

These researchers may well serve as models for children who have had little opportunity to learn of Black contributions to science and technology, and as motivation for students who are uncertain about continuing their studies or selecting professions.

New generations of Black students are being trained in the applied sciences and engineering. As opportunities develop for advanced schooling and careers, Black contributions should increase in number, expand in scope, and enhance the living standards of all Americans.

Contents

Page

2 Norbert Rillieux
Elijah McCoy

4 Lewis H. Latimer
Granville Woods

6 Garrett A. Morgan
Archie Alexander

8 David Crosthwait
Frederick M. Jones

10 Louis W. Roberts
Katherine Johnson

12 Otis Boykin
O.S. (Ozzie) Williams

14 J. Ernest Wilkins
Rufus Stokes

16 Virgil Trice
Meredith Gourdine

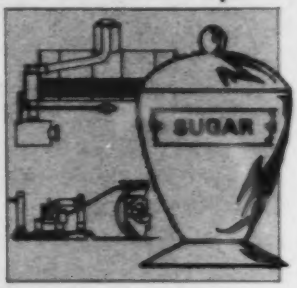
18 Annie Easley
James Harris

20 Caldwell McCoy
Clarence Elder

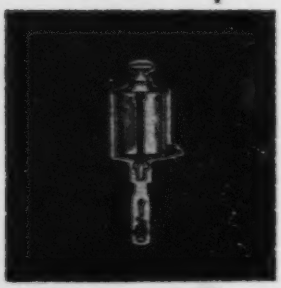
22 Cordell Reed
Donald Cotton

24 Ernest Coleman
Lawnie Taylor

Cut Costs and Energy in Refining Sugar



Automatic Machine Oiling—The Real McCoy



Norbert Rillieux, 1806-1894

Norbert Rillieux revolutionized the sugar industry by inventing a refining process that reduced the time, cost, and safety risk involved in producing good sugar from cane and beets.

The son of a French planter/ engineer and a slave mother, Rillieux was born in New Orleans and educated in France, where he majored in engineering and also served as an instructor.

Returning to New Orleans, he noted that methods for refining sugar from cane and beets were crude, backbreaking and dangerous, requiring slaves to ladle boiling cane juice from one kettle to another to produce a dark sugar. Rillieux designed an evaporating pan which enclosed a series of condensing coils in vacuum chambers. His system took much of the hand labor out of refining, saved fuel because the juice boiled at lower temperatures, and produced a superior product.

Rillieux's device was patented in 1846, and was in great demand on plantations in Louisiana, Mexico and the West Indies, where it increased sugar production and reduced operating costs.

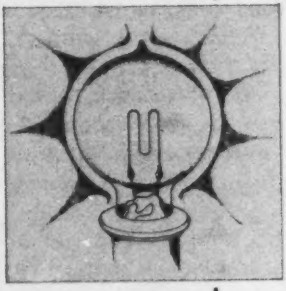
Elijah McCoy, 1843-1929

The lubricating cup, which made possible the automatic oiling of machinery, was invented by Elijah McCoy, the Canadian-born son of runaway slaves.

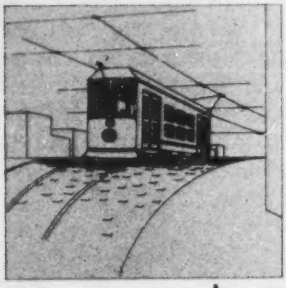
Educated in Scotland as a mechanical engineer, McCoy settled in Detroit on his return to the United States, and started experimenting with a cup that regulated the flow of oil onto moving parts of machines.

In 1872, he was granted a patent for the first automatic lubricator. No longer did machines have to be stopped for oiling; his new oiling device revolutionized the machine industry. McCoy established his own firm and obtained patents for additional inventions, such as an "ironing table" and a lawn sprinkler; however, his major contribution was the lubricating cup which was to become so popular that persons inspecting new equipment generally asked if it contained the "real McCoy," meaning the McCoy oiling device. This helped popularize an American expression, meaning the "real thing."

Electric-Lighting Pioneer



On the Move with Advanced Trolleys and Safer Trains



Lewis H. Latimer, 1848-1928

Lewis H. Latimer, a member of Thomas Edison's research team, made outstanding contributions to the development and commercialization of the electric light.

Born in Boston, Latimer first worked as a draftsman in a patent office. He later became interested in electric lighting and began a long, productive career in the field, during which he both patented a process for making carbon filament for light bulbs and invented the bulb's threaded socket. He helped install the carbon filament lighting system in New York City, Philadelphia, Montreal and London.

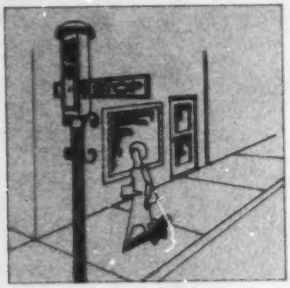
In 1884, Latimer joined the Edison Electric Light Company, where he did research and, in 1890, wrote *Incandescent Electric Lighting,* a book which became a guide for lighting engineers. For many years, he served as an expert witness in court battles over Edison's patents. At Latimer's death, the Edison Pioneers, of which he was a charter member, attributed his "important inventions" to a "keen perception of the potential of the electric light and kindred industries."

Granville Woods, 1856-1910

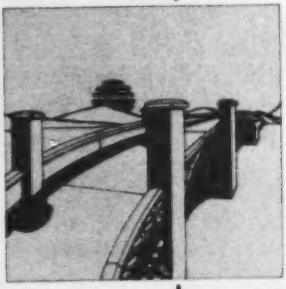
Granville Woods was awarded more than 35 patents for electrical systems and devices which created new energy techniques for the transportation and communication industries.

Born in Columbus, Ohio, Woods migrated to Missouri and worked in a variety of jobs which gave him the experience to formulate his inventions. In 1884, he secured his first patent for a furnace and boiler to produce steam heat. In the years that followed, the prolific inventor improved the telephone transmitter and developed an electric car powered by overhead wires, a grooved wheel for the trolley car, a "third rail" system for an electric locomotive, an improved airbrake system, and a telegraph system for communicating between moving trains, which contributed to railroad safety. Woods sold most of his inventions to the General Electric, Westinghouse and Bell Telephone Companies.

Gas Masks and Traffic Signals—Life-Saving Inventions



Engineered Bridges, Powerplants, and Major Structures Across the Nation



Garrett A. Morgan, 1877-1963

Kentucky-born Garrett Morgan received wide recognition for his outstanding contributions to public safety. Firemen in many cities in the early 1900's wore the safety helmet and gas mask that he invented, and for which he was awarded a gold medal at the Second International Exposition of Safety and Sanitation in New York in 1914. Two years later, he himself used the mask to rescue men trapped by a gas explosion in a tunnel being constructed under Lake Erie. Following the disaster which took 21 lives, the City of Cleveland honored him with a gold medal for his heroic efforts.

In 1923, Morgan received a patent for his new concept—a traffic signal to regulate vehicle movement in city areas. "Stop" and "Go" signs were systematically raised and lowered at intersections to bring order out of chaos and improve traffic safety. Some years later, after he had sold his design to the General Electric Company, Morgan's device was replaced with the light signal in use today.

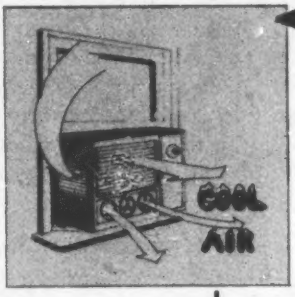
Archie Alexander, 1888-1958

Archie Alexander, a design and construction engineer, left his stamp on the landscape of America by building bridges, freeways, airfields, railroad trestles and powerplants.

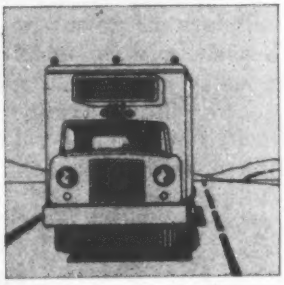
Born in Iowa, Alexander attended the State University and received an engineering degree in 1912. After several years as a design engineer, he and a former classmate established their own engineering firm and constructed major projects across the Nation. Starting at home, they built the heating plant and powerhouse at the University of Iowa, a sewage treatment plant in Grand Rapids, Michigan, an airfield in Tuskegee, Alabama, and the Tidal Basin bridge and seawall and the Whitehurst Freeway in Washington, D.C.

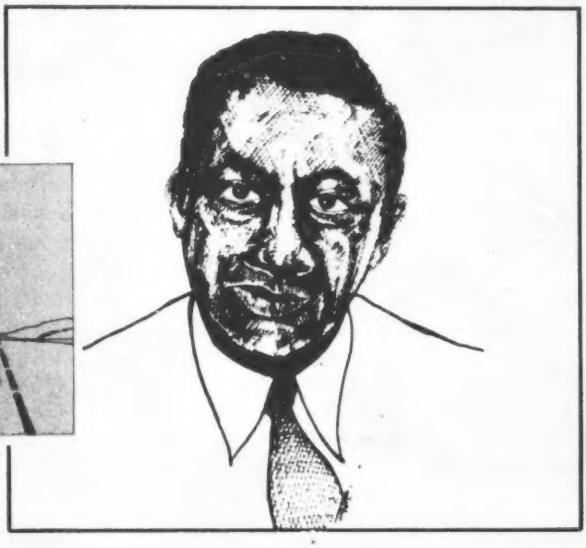
Alexander received many awards during the course of his career. At the centennial celebration of the University of Iowa in 1947, he was named one of its outstanding alumni. In 1954, President Eisenhower honored him with the appointment as Territorial Governor of the Virgin Islands.

A Man for all Seasons—Heating, Air-Conditioning, and Ventilation Designer



Changed Our Eating Habits with Refrigeration





David Crosthwait, 1891 - 1976

For his outstanding contributions to engineering technology, David Crosthwait was awarded an honorary doctoral degree in 1975 from Purdue University, the same school that had awarded him a B.S. in mechanical engineering 62 years earlier. In the years between, he had received 34 U.S. patents and 80 foreign patents relating to the design, installation, testing, and servicing of powerplants and heating and ventilating systems.

Crosthwait worked for the Dunham Company of Chicago during much of his career and headed its research laboratory in Marshalltown, Iowa. Later he served as technical advisor to the company.

An authority on heat transfer, ventilation, and air conditioning, Crosthwait invented several new systems. He developed the control systems and the variable vacuum system of heating for major buildings including Rockefeller Center in New York City. His writings included a manual on heating and cooling with water and guides, standards and codes dealing with heating ventilation, refrigeration, and air conditioning.

After retiring from industry in 1969, Crosthwait contined to share his knowledge by teaching a course on steam heating theory and controls at Purdue.

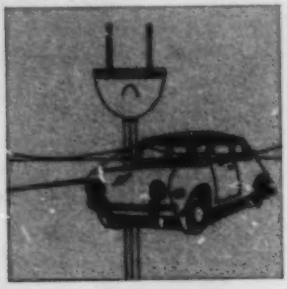
Frederick M. Jones, 1892-1961

Frederick M. Jones held more than 60 patents in a variety of fields, but refrigeration was his specialization. In 1935, he invented the first automatic refrigeration system for long-haul trucks. Later, the system was adapted to a variety of other carriers, including ships and railway cars. His invention eliminated the problem of food spoilage and changed America's eating habits. In addition, Jones developed an air-conditioning unit for military field hospitals, a portable x-ray machine, and a refrigerator for military field kitchens.

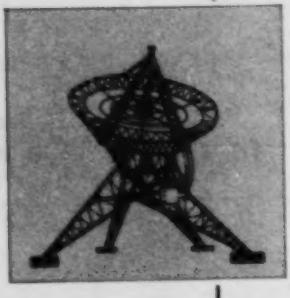
Born in Ohio, Jones served in France during World War I. After the war, he worked as a garage mechanic and, from the knowledge gained in this early experience, developed a self-starting gasoline motor. In the late 1920's, Jones designed a series of devices for the growing movie industry, adapting silent movie projectors to accommodate talking films, and developing the box-office equipment that delivers tickets and spills out change.

285-670 O - 79 - 2

Electronics and Energy-Saving Cars



Mapping and Tracking Space Missions



Louis W. Roberts, 1913-

Louis W. Roberts, physicist, mathematician and electronics specialist, is Director of Energy and Environment at the Transportation System Center in Cambridge, Mass. The center, part of the U.S. Department of Transportation, develops energy conservation practices for the transportation industry. Currently, the industry uses about half of this country's total petroleum demand, but is required by the Energy Conservation Policy Act to reduce fuel use in all vehicles.

Roberts' productive career has included an assignment as chief of the Optics and Microwave Laboratory in the Electronics Research Center of the National Aeronautics and Space Administration. Earlier, he founded, and was president of, his own microwave concern. In addition to his industrial and government research experience, Roberts has served as a professor of physics at Howard University and professor of math and physics at St. Augustine's College.

Educated at Fisk University and the University of Michigan, Roberts holds 11 patents, all in electronic devices, and has written many papers on electromagnetism, optics and microwaves.

Katherine Johnson, 1918 -

Katherine Johnson is an Aerospace Technologist at the National Aeronautics and Space Administration's Langley Research Center, Hampton, Virginia. Trained as a mathematician and physicist in colleges of her native West Virginia, she has worked on absorbing problems of interplanetary trajectories, space navigation, and the orbits of spacecraft. These spacecraft included the Earth Resources Satellite which has helped locate underground minerals and other essential earth resources.

Johnson analyzed data gathered by tracking stations around the world during the lunar orbital missions—the moon shots. Later, she studied new navigation procedures to determine more practical ways to track manned and unmanned space missions. For her pioneer work in this field, she was a recipient of the Group Achievement Award presented to NASA's Lunar Spacecraft and Operations team.

Electronic Devices for Heart Stimulators and Guided Missiles

From Rockets to Solar And Wind Energy for Africa

Otis Boykin, 1920-

Otis Boykin, who began his career as a laboratory assistant testing automatic controls for airplanes, has invented a wide range of electronic devices. One of his first achievements was a type of resistor now used in many computers, radios, television sets, and other electronically controlled devices. In addition, Boykin has developed a control unit for artificial heart stimulators, a variable resistor used in guided missiles, small components such as thick-film resistors for computers, a burglar-proof cash register, and a chemical air filter.

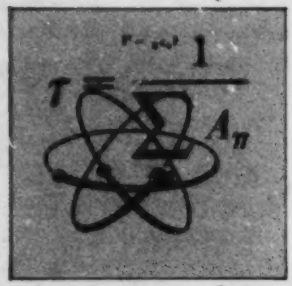
His innovations have had both military and commercial application. Some have reduced the cost of producing electronic controls for radio and television. At present, more than three dozen products with Boykin components are used throughout the world.

O.S. (Ozzie) Williams, 1921-

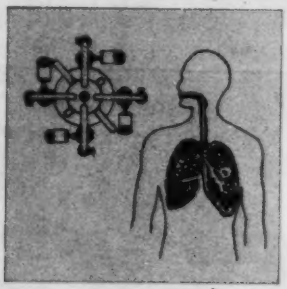
O.S. (Ozzie) Williams was the first Black aeronautical engineer to be hired by Republic Aviation, Inc., during World War II. Subsequently, he joined Greer Hydraulics, Inc., where he became a group project engineer and helped develop the first airborne radar beacon for locating crashed aircraft. A specialist in small rocket engine design, Williams also was associated with the Reaction Motors Division of Thiokol Chemical Corporation.

In 1961, he joined Grumman International, where he was in charge of developing and producing the control rocket systems that guided lunar modules during moon landings. This responsibility included administering nearly forty million dollars in subcontracts. Williams now is vice president of the firm, in charge of trade and industrial relations with emerging African nations; here his work includes the application of solar and wind energy to African needs.

Ph.D. at 19
Leads to Nuclear and
Space Research



Clean Air Machine for
Environment and
Health



J. Ernest Wilkins, Jr., 1923-

Mathematician, physicist and engineer, J. Ernest Wilkins, Jr., has contributed his talents mainly to the research and development of nuclear power.

As a teenager, Wilkins attracted nationwide attention when he received his college degree at age 17 and his doctorate from the University of Chicago at 19. He taught mathematics and did research at the University's Metallurgical Laboratory which was working on the atomic bomb. Later, he became part owner of a company which designed and developed nuclear reactors for power generation.

His primary achievement has been the development of shields against gamma rays from the sun and nuclear sources. He developed mathematical models by which the amount of gamma rays absorbed by a given material may be calculated; this technique is in wide use among researchers in space and nuclear projects.

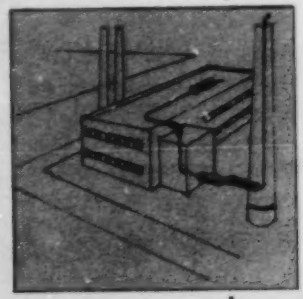
Wilkins served for several years as Distinguished Professor of Applied Mathematical Physics at Howard University. A member of the National Academy of Engineering, he was formerly president of the American Nuclear Society.

Rufus Stokes, 1924-

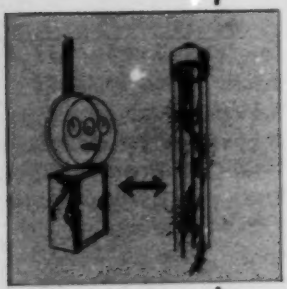
Rufus Stokes' concern for cleaner air for all Americans caused him to focus his research on developing air filtration equipment. Born in Alabama, Stokes later moved to Illinois where he worked as a machinist for an incinerator company. In 1968, he was granted a patent on an air-purification device to reduce to a safe level the gases and ash from furnace and powerplant smoke; the filtered smoke also became nearly invisible.

Stokes has tested and demonstrated several models of his "clean air machine" in Chicago and elsewhere to show that it may be used in many ways. His system is intended, not only to help people with respiratory problems, but to benefit plants and animals as well; a side effect of the filtered air is the improvement in the appearance and durability of objects such as cars and buildings that are usually exposed to outdoor pollution for lengthy periods.

Managing the Radioactive Wastes of Nuclear Power Generation



High-Voltage Electricity from Natural Gas



Virgil G. Trice, Jr., 1926 -

Virgil Trice has spent almost 30 years in developing nuclear energy and now is primarily concerned with managing the radioactive waste that results from nuclear power generation.

He has been working in the waste management field since 1971 when he joined the Atomic Energy Commission. In 1975 the AEC was abolished and he transferred to the Energy Research and Development Administration and then to the Department of Energy when it was established in 1977. He is responsible for radioactive waste management planning, reporting, and program control—an area important to the future of nuclear power.

From 1949 to 1971 Trice worked at the Argonne National Laboratory on research and development, economic evaluation, and program planning of concepts for nuclear fuel reprocessing and power reactors.

Born in Indianapolis, Trice attended Purdue University where he received B.S. and M.S. degrees in chemical engineering. He also received an M.S. in industrial engineering from the Illinois Institute of Technology. His career includes teaching part time as Associate Professor of Chemical Engineering at Howard University.

Meredith Gourdine, 1929-

Meredith Gourdine is best known for his pioneering work in electrogasdynamics, a way of producing high-voltage electricity from natural gas. His research has the potential to improve refrigeration for preserving foods, supply power for heat and light in homes, burn coal more efficiently, and desalt sea water.

Head of his own research and development company in New Jersey, Gourdine and his associates have developed a variety of devices: an exhaust-purifying system for cars; equipment for reducing incinerator smoke pollution from older apartment houses; a technique for dispersing fog from airport runways; and a system for production-line coating of metal products, which reduces production costs and the amount of pollutants released to the atmosphere.

Formerly chief scientist with the Curtiss-Wright Corp., Gourdine served on the Presidential Advisory Panel on Energy in 1964. A man of many talents, he also won a silver medal in track at the 1952 Olympics.

Computer Codes for Energy Technology

Teamwork Discovers New Chemical Elements

Annie Easley, 1932 -

Annie Easley is among the growing group of women who are making major contributions to energy research and management. Working at the National Aeronautics and Space Administration's Lewis Research Center in Cleveland, Ohio, Easley develops and implements computer codes used in solar, wind, and other energy projects. Her energy assignments have included studies to determine the life of storage batteries (such as those used in electric vehicles) and to identify energy conversion systems that offer the greatest improvement over commercially available technology.

A native of Birmingham, Alabama, Easley has worked for NASA and its predecessor agency since 1955. She continued her education while working and, in 1977, obtained a degree in mathematics from Cleveland State University. Over the years she attended many courses in her specialization offered by NASA.

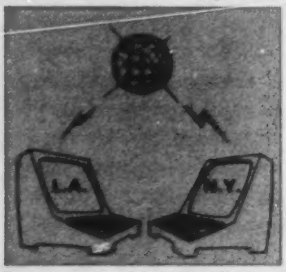
James Harris , 1932 -

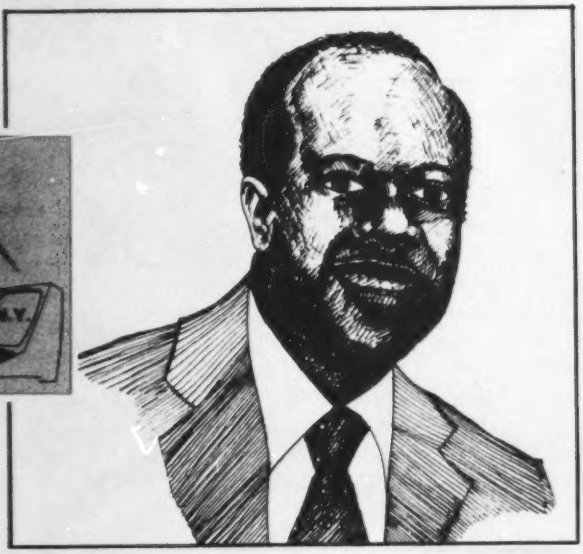
Nuclear chemist James Harris was a member of the scientific team at Lawrence Berkeley Laboratory that discovered two new elements just a few years ago. Harris joined the laboratory, which is operated for the Department of Energy by the University of California, in 1960, after years of research at Tracerlab, Inc. At Berkeley he sought to complete the periodic table of chemical elements.

In the course of several years the laboratory produced a number of new elements by bombarding special targets in an accelerator. The research team purified and prepared the target material and, after hundreds of hours of bombarding the target with carbon, detected element 104 for a few seconds in 1969. Element 105 was produced in 1970 when the same target was bombarded with nitrogen. Element 104 was named Rutherfordium, and 105, Hahnium, in honor of two atomic pioneers.

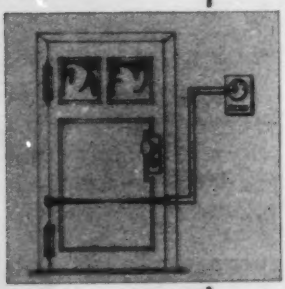
Unlike most of his colleagues, Harris did not have a Ph.D. degree. The Texas native had a B.S. from Houston-Tillotson College in Austin and had taken graduate courses in chemistry and physics. However, his alma mater conferred an honorary doctorate upon him in 1973, largely because of his work as co-discoverer of elements 104 and 105.

Looking Ahead to Energy from Magnetic Fusion





The Energy-Saving "Occustat"



Caldwell McCoy, 1933 -

As program manager for the National Magnetic Fusion Energy Computer Network, Caldwell McCoy directs the Nation's largest network devoted to a single scientific problem—that of achieving usable energy from magnetic fusion. The Department of Energy network serves over 800 users of experimental data across the country.

A native of Hartford, McCoy earned an electrical engineering degree at the University of Connecticut and then received both Master and Doctor of Science degrees, the latter in telecommunications, from George Washington University.

From 1959 to 1976, McCoy designed, tested, and evaluated systems for detecting and tracking submarines. For his achievements in developing long-range anti-submarine systems at the Naval Research Laboratory in Washington, D.C., he was awarded the Laboratory's Thomas Edison Fellowship in 1968. Since 1976 he has been part of the magnetic fusion energy program, first with the Energy Research and Development Administration and then its successor agency, the Department of Energy.

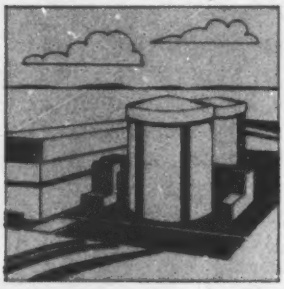
Clarence L. Elder, 1935-

Head of his own research and development firm in Baltimore, Clarence Elder was awarded a patent in 1976 for a monitoring and control energy conservation system. His "Occustat" is designed to reduce energy waste in temporarily vacant homes and other buildings, and may be especially valuable for motels and hotels. The system consists of connecting each energy unit to an electronic beam attached to the building entrance to monitor incoming and outgoing occupants. When the house or apartment is empty of people, the beam sets the Occustat system into motion, reducing energy demand and achieving energy savings up to 30 percent.

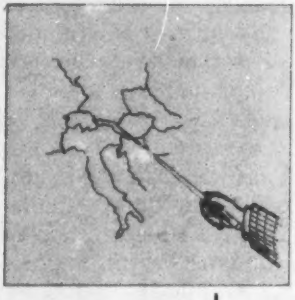
Elder and his associates also have developed other systems and devices for which they have received 12 U.S. and foreign patents, trademarks and copyrights.

Born in Georgia, and graduated from Morgan State College, Elder was awarded a plaque at the New York International Patent Exposition in 1969 for "Outstanding Achievement in the Field of Electronics."

Nuclear Electric Power



Propellants and Nuclear Reactors— Energy from Research in Chemistry



Cordell Reed, 1938-

Cordell Reed, Assistant Vice President of the Commonwealth Edison Company of Chicago, is in charge of nuclear licensing and environmental activities.

Reed has been with the company since 1960, starting as an engineer assigned to the design, construction and operation of coal-fired generating stations. In 1967, he transferred to the nuclear division, with the task of developing more efficient and productive powerplants. In 1975, Reed was appointed manager of the nuclear engineering department, where he headed a group of 75 engineers who were responsible for the engineering design of all nuclear projects. In this period, Commonwealth became the Nation's leading nuclear utility; currently the company has seven nuclear power plants in operation capable of producing more than 5,400,000 kilowatts of electricity, and is constructing additional units with a capacity of 6,600,000 kilowatts.

A native of Chicago, Reed holds a masters degree in engineering from the University of Illinois.

Donald Cotton, 1939 -

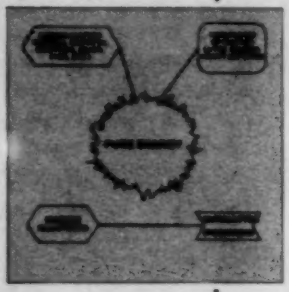
Donald Cotton, the technical lead for nuclear chemistry research and development at the Department of Energy, plans, manages, and evaluates research and development on reactor materials and chemistry carried out in DOE national laboratories. He identifies the breeder reactor needs of less-developed nations -an assignment which has taken him to several European states.

Dr. Cotton first worked as a physical chemist at the Naval Propellant Plant at Indian Head, Maryland. From there he moved to the Marine Engineering Laboratory in Annapolis where he worked on the combustion of hydrocarbon fuels and invented a microwave absorption technique for measuring solid propellant burning rates. Later he researched liquid state chemistry and liquid gas propellants.

His career extended beyond the laboratory. For 2 years Cotton was science editor for Libratterian Books, presenting scientific and technical subjects to lay readers.

Cotton's degrees in physical chemistry include an M.S. from Yale University and a Ph.D from Howard. He has lectured at universities in Africa and South America, has patents to his credit, and has written many scientific papers.

From Developing Physics Research to Developing Gifted Students



Moving Solar Technology from the Laboratory to Industry

Ernest Coleman, 1942 -

Ernest Coleman has directed high energy physics research at three Federal agencies—the Atomic Energy Commission, the Energy Research and Development Administration, and the Department of Energy.

Coleman, a Phi Beta Kappa student at the University of Michigan, received his B.S., M.S., and Ph.D. degrees there. After graduation he was awarded a year's research fellowship in high energy physics by the German Government and studied in Hamburg. Upon his return to the United States, Coleman taught at the University of Minnesota, first as Assistant Professor of Physics and then as Associate Professor.

During a year as visiting Professor at Stanford University he became director of the summer science program for gifted disadvantaged college students. He has continued to head this program and has brought highly motivated and able students into the field of physics.

For his contributions to physics education, particularly for disadvantaged students, and for his contributions to physics research and its applications in education, Coleman received the Distinguished Service Award of the American Association of Physics Teachers.

Lawnie Taylor

Physicist Lawnie Taylor, chief of market development and training in the Department of Energy's solar offices, plans and directs programs to accelerate the commercialization of newly developed solar technologies.

Before joining the Energy Research and Development Administration in 1975, Taylor operated his own building-system engineering firm in Los Angeles. Previously he held scientific research and management positions in Columbia University's Nuclear Laboratory, the Aerojet-General Corporation's nuclear rocket project, and the Xerox Corporation's space program. Taylor received a NASA award for his development of an Apollo experiment.

Taylor received his B.S. and M.A. degrees in physics from Columbia University and has completed academic requirements for the Ph.D. in physics at the University of Southern California.

Among his many civic activities Taylor has been a newspaper publisher and the founder of several recognized organizations concerned with housing, education, and economic development in the low-income community. Taylor has also authored many publications on science and technology, education, and equal opportunity.

U. S. GOVERNMENT PRINTING OFFICE : 1979 O - 285-670